Prospects of Implementing a Solar Water Heating System in a Large Hotel: A case study of Borovoe, Kazakhstan

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Kazakhstan is one of the largest emitters of greenhouse gases (GHG) per capita in the world. Indeed, 89% of power generation in Kazakhstan is based on fossil fuels, mostly burned in coal-fired power plants. However, technological advances in renewable energy offer the opportunity to provide sustainable energy with reduced GHG emissions. One of these mature clean technologies is represented by Solar Water Heating (SWH) systems. This study assesses the technical-economic feasibility of the installation of a SWH system in The Rixos Borovoe Hotel, which is located 8 km away from Scucinsk, Akmola Region, Kazakhstan. The proposed system consists of 50 glazed solar collectors Kingspan FPW 25 to partially satisfy the hot water demand of the hotel with 200 rooms at a total cost of 14 090 800 KZT. The analysis was conducted using the clean energy management software – RetScreen V4. Two financing scenarios were investigated in the project. The first one was the government-supported loan with reduced interest rate from Damu Fund, while the second scenario was a loan from a conventional bank, as for example, “Halyk Bank”. Both cases demonstrated reasonable equity payback periods of 10.2 and 11.3 years, respectively. NPV for both cases exceeded 28 million KZT with B-C cost ratios of 21.48 and 19.61. In addition, it is estimated that the implementation of the system in the hotel results in net GHG emissions reduction of 21 tCO_2 annually. The study makes it evident that the use of SWH for a hotel in Borovoe has environmental and economic benefits when compared with the conventional electric heating systems.